

WHAT IS CLAIMED:

1. A closed circuit solvent drying method comprising the steps of:
 - placing an object to be dried of water in a chamber;
 - sealing the chamber;
 - evacuating the air from said chamber to reduce the pressure within said chamber to create a vacuum condition;
 - introducing a fluid to the evacuated chamber from a fluid supply tank to heat the object contained therein and vaporize the water on the object;
 - continuously recovering the fluid and water vapor from the object and the chamber while continuously introducing additional fluid to the chamber;
 - ceasing the introduction of fluid to the chamber;
 - recovering the fluid from the object and chamber;
 - introducing a non-condensable gas to the chamber to return the chamber to atmospheric pressure;
 - opening the chamber and removing the object; and
 - separating said drying fluid from the recovered water vapor and retaining said drying solvent for use in drying subsequent objects.
2. The solvent drying method in claim 1, wherein said step of reducing the pressure within said chamber comprises reducing the pressure to between atmospheric pressure and zero absolute pressure.

3. The solvent drying method in claim 1, wherein said step of continuously recovering the fluid and water vapor from the object and chamber comprises withdrawing the fluid and water vapor in a vapor state by reducing the pressure in the chamber using a device selected from the group consisting of: a vacuum pump, an ejector, a condenser, an aspirator and a cryogenic pump.

4. The solvent drying method in claim 1, wherein the step of introducing said drying fluid into said chamber is selected from the group consisting of: vapor, gas-vapor mixture, aerosol spray, liquid spray and liquid soak.

5. The solvent drying method in claim 1, wherein the step of introducing said drying fluid into said chamber includes throttling said fluid through a valve or other flow restricting device so as to control the pressure in said drying chamber.

6. The solvent drying method in claim 1, said step of recovering said drying fluid from said object and said chamber further comprising:

withdrawing a first portion of said fluid from said chamber in a liquid state;
and

withdrawing the remaining portion of said fluid from said chamber in a vapor state.

7. The solvent drying method in claim 6, said step of withdrawing said fluid in a vapor state further comprises:

reducing the pressure in said chamber causing said fluid to flash to form a vapor; and

withdrawing said vapor from said chamber.

8. The solvent drying method of claim 1, wherein said water removed from the object and the fluid used for drying the object is separated in a water separator and stored in separate holding tanks for future use.

9. The solvent drying method of claim 1, wherein the fluid introduced to the chamber also serves as a rinsing fluid for the object and chamber.

10. The solvent drying method of claim 1, wherein the fluid introduced to the chamber for drying the object also treats the object using a method selected from the group consisting of: etching, abrasion, blasting, dissolving, debinding, penetrating, particle removal and impregnating.

11. The solvent drying method of claim 1, wherein the fluid introduced to the chamber is introduced rapidly thereby drying the object so rapidly that particles or non-volatile residue is mechanically lifted from the surface or pores of the object to prevent spotting and produce a particle free surface.